

(19)



(11)

EP 2 242 139 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
05.04.2017 Bulletin 2017/14

(51) Int Cl.:
B62K 11/10 ^(2006.01) **H01M 8/0662** ^(2016.01)
H01M 8/04014 ^(2016.01)

(21) Application number: **10158230.2**

(22) Date of filing: **29.03.2010**

(54) **Small vehicle mounted with a fuel cell**

Kleinfahrzeug mit Brennstoffzelle

Petit véhicule doté d'une pile à combustible

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK SM TR**

(30) Priority: **13.04.2009 JP 2009096677**

(43) Date of publication of application:
20.10.2010 Bulletin 2010/42

(73) Proprietor: **Suzuki Motor Corporation
Shizuoka 432-8611 (JP)**

(72) Inventor: **Tamura, Kouichi
Hamamatsu-shi Shizuoka (JP)**

(74) Representative: **Hirsch & Associés
137, rue de l'Université
75007 Paris (FR)**

(56) References cited:
**EP-A1- 1 793 446 EP-A2- 1 495 956
US-A1- 2008 166 607**

EP 2 242 139 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to a small vehicle mounted with a fuel battery, particularly to a small vehicle mounted with a fuel battery that is provided with an exhaust duct for exhausting air with a smaller airflow resistance. After cooling the fuel battery, the air and hydrogen emitted from the fuel battery are exhausted outside the vehicle.

[0002] There have been developed small vehicles such as motorcycles and auto bicycles in which, in place of fossil fuel such as gasoline or the like, a fuel battery is mounted as an energy source therefor. In these small vehicles, electric power generated by a fuel battery mounted thereon is supplied to a motor to drive a drive wheel.

[0003] As disclosed in Japanese Patent Application Laid-Open Publication No. 2008-213742, in small vehicles mounted with a fuel battery, the fuel battery is disposed in front of a rear wheel, and a power unit equipped with a motor is attached to a frame so as to swing in a vertical direction with respect to the frame. The power unit is provided with a drainpipe for draining water generated within the fuel battery to the outside. The drainpipe is disposed inside and through the fuel battery, and extends up to and beyond the rear wheel. The drainpipe has a drain port formed at the rear end thereof to drain water while preventing the drained water from splashing onto a rider and/or vehicle body.

[0004] In a small vehicle mounted with a fuel battery, air is introduced to the fuel battery. The air introduced into the fuel battery has two functions; i.e., a function as an oxidizing agent for causing hydrogen to react within the fuel battery, and a function as a cooling medium for cooling the fuel battery. The air is introduced into the fuel battery using a fan. In order to increase the system efficiency, some fuel battery systems employ a fan, which introduces the air to the fuel battery with low power consumption, to control the fuel battery.

[0005] Conventionally a cylindrical pipe of a small diameter is used for the exhaust duct. However, in the conventional cylindrical pipe, the sectional area of the airflow path is too small, leading to a large pressure loss in the duct path. Therefore, there is a problem that a fan of small power consumption is not suitable for supplying a satisfactory amount of air to the fuel battery. Also, depending on the battery conditions, the fuel battery purges hydrogen to the air exhaust. The hydrogen has to be appropriately diluted and discharged out of the vehicle. Further, the air within the exhaust duct contains water (vapor) generated by the fuel battery. The water of condensed vapor has to be discharged out of the vehicle to prevent the water from being fed back to the fuel battery.

[0006] EP-A-1 793 446 discloses a cooling apparatus for fuel cell vehicle.

[0007] An object of the invention is to provide a small vehicle mounted with a fuel battery using a fan that provides a small output with a small power consumption, to

supply a satisfactory amount of air to the fuel battery; and equipped with an exhaust duct capable of reducing the pressure loss and accordingly airflow resistance within the duct, and discharging hydrogen purged from the fuel battery and water in the exhaust duct outwardly of the vehicle.

[0008] The invention provides a vehicle mounted with a fuel battery for generating electric power supplied to a motor for driving a drive wheel according to claim 1.

[0009] In the small vehicle mounted with a fuel battery according to the invention, the exhaust duct is divided into two parts to avoid the frame. Therefore, the exhaust duct is assembled easily even when the frame has a complicated structure. Thus, a maximum space for airflow is ensured in the exhaust duct.

[0010] Further, in the small vehicle mounted with the fuel battery according to the invention, a large space for the exhaust duct is ensured. Therefore, pressure loss and accordingly, the airflow resistance within the exhaust duct is reduced. Therefore, a fan of small capacity may be employed. Therefore, the electrical power consumption by the fan can be reduced, and the system efficiency of the fuel battery system can be increased.

[0011] According to an embodiment of the invention, the first exhaust duct is formed with a first inlet port connected to an air outlet port of the fan box, and the first inlet port is provided with a hydrogen purge pipe opened in the vicinity thereof for discharging hydrogen purged from the fuel battery.

[0012] According to another embodiment of the invention, the first exhaust duct is connected to the second exhaust duct with interposition of a seal therebetween.

[0013] The second exhaust duct is formed so that the second upper bifurcation is inclined upward toward the rear side thereof.

[0014] In the vehicle mounted with a fuel battery according to the invention the second exhaust duct may be provided with a water reservoir at the bottom of the second lower bifurcation, and a second water drain port for draining water received in the water reservoir at the side which moves to a lower position when the vehicle is inclined on a side stand.

[0015] In the second exhaust duct of the vehicle according to the invention, the second upper bifurcation and the second lower bifurcation can be formed so as to fit with the shape of a rear combination lamp and a rear fender and the rear fender can be formed so as to fit with the shape of the second lower outlet port of the second lower bifurcation for avoiding a number plate illumination lamp.

[0016] Embodiments of the invention will be described below with reference to the drawings, in which:

FIG. 1 is a side view of a small vehicle with a tail body removed.

FIG. 2 is a plan view of a small vehicle with a tail body removed.

FIG. 3 is a side view of a fuel battery and an exhaust

duct, a part of which is removed.

FIG. 4 is a rear view of a fuel battery and exhaust duct.

FIG. 5 is a rear view of a small vehicle.

FIG. 6 is a block diagram of a fuel battery system.

FIG. 7 is a side view of a small vehicle mounted with a fuel battery.

[0017] The present invention provides a small vehicle mounted with a fuel battery intended to achieve a smaller or reduced pressure loss at or along an exhaust duct by reducing the airflow resistance which results in smaller power consumption by a fan; and thereby, increase the efficiency of a fuel battery system.

[0018] In FIG. 6, a fuel battery system 1 supplies hydrogen stored in a fuel tank 2 and air sucked from the outside by a fan 3 to a fuel battery 4, to cause an electrochemical reaction to thereby generate electric power. Generated electric power is supplied to a power conversion and distribution unit 6 by a power control unit 5. The power conversion and distribution unit 6 supplies the electric power generated by the fuel battery 4 to a secondary battery 7 to charge the same with electric power. The electric power from the fuel battery 4 and/or the secondary battery 7 is supplied to a motor 9 through a motor controller 8 to drive the motor 9.

[0019] In the fuel battery system 1, temperature of the fuel battery 4 rises to a high degree due to hydrogen-oxygen reaction. A part of the air introduced by the fan 3 is circulated to cool down the fuel battery 4. After cooling the fuel battery 4, the air is exhausted through an exhaust duct 10. The hydrogen purged from the fuel battery 4 is discharged to the exhaust duct 10 through a hydrogen purge pipe 11. A purge valve 12 controls the flow rate and timing of the hydrogen purged through the hydrogen purge pipe 11.

[0020] The fuel battery system 1 is mounted on a small vehicle (for example, a motorcycle) 13 as shown in FIG. 7. The small vehicle 13 has a pair of right and left main frames 14 constituting the vehicle body. The pair of main frames 14 are formed in a generally U-like shape with a pair of lower frame portions 15, a pair of front frame portions 16 and a pair of rear frame portions 17. The pair of lower frame portions 15 extend in a front-rear direction. The pair of front frame portions 16 extend sharply upward at an angle from the front side of the pair of lower frame portions 15. The pair of rear frame portions 17 extend sharply upward at an angle from the rear side of the pair of lower frame portions 15. The pair of rear frame portions 17 are bent in a half way, and then extend gently upward therefrom at an angle.

[0021] In the pair of right and left main frames 14, the pair of front frame portions 16 extend sharply upward and are attached to a head pipe 18, respectively at the front ends thereof. The head pipe 18 supports a front fork 19 so as to allow the front fork 19 to steer rightward/leftward. The front fork 19 pivots a front wheel 20 at the lower end thereof. A handlebar 21 is attached to an upper end of

the front fork 19. A front cover 22 covers the head pipe 18.

[0022] In the pair of right and left main frames 14, a pair of upper frames 23 bridge the pair of front frame portions 16 and the pair of rear frame portions 17, being connected at a midpoint thereof, respectively. A pair of rear frames 24 connect at the rear end of the pair of rear frame portions 17, respectively. The pair of rear frames 24 curve upward at an angle and extend upward becoming gradually sharper toward the rear side, and then in the vicinity of the rear end thereof, gently extend straight upward at an angle. In the pair of main frames 14, the pair of rear frame portions 17 pivot the front end of a pair of swing arms 25. The pair of swing arms 25 pivot a rear wheel 26 as the drive wheel at the rear end thereof. A pair of rear suspensions 27 connect between the pair of swing arms 25 and the pair of rear frames 24 to support the pair of swing arms 25. In the pair of main frames 14, a center stand 28 is provided to the pair of lower frame portions 15 at the rear side thereof and a side stand 29 is provided at the left side thereof

[0023] The pair of upper frames 23 and the rear frames 24 are provided with a main body 30 attached thereto in the upper side thereof, and a front seat 31 and a rear seat 32 are mounted thereon. A tail body 33 is attached to the pair of rear frames 24. A rear combination lamp 34 is attached to the tail body 33 in a lower portion thereof. A rear fender 35 is attached to the rear combination lamp 34 in a lower portion thereof. The rear fender 35 is provided with a number plate 36 and a number plate illumination lamp 37 for illuminating the number plate 36 as shown in FIG. 5. In FIG. 5, reference numeral 38 denotes a pair of right and left side fenders.

[0024] The small vehicle 13 is mounted with the fuel tank 2 for the fuel battery system 1 disposed between the pair of lower frame portions 15, the pair of front frame portions 16 and the pair of upper frames 23 connected to the pair of rear frame portions 17 in the pair of right and left main frames 14. The fuel tank 2 is provided with a hydrogen filling port 39. The power conversion and distribution unit 6 and the secondary battery 7 are mounted in an area above the pair of rear frame portions 17 and the pair of upper frames 23 and below the main body 30 in the pair of main frames 14. The fan 3, the fuel battery 4 and the exhaust duct 10 are mounted in an area above the pair of rear frames 24 and below the main body 30. The hydrogen sensor 40 is provided in an area above the fuel battery 4 and below the main body 30. The motor 9 is mounted on the pair of swing arms 25.

[0025] The small vehicle 13 is powered by driving the motor 9 using the electric power from the fuel battery 4 and/or the secondary battery 7 to rotate the rear wheel 26 as the drive wheel.

[0026] In the small vehicle 13, the fuel battery 4 is mounted on the pair of rear frames 24 constituting the vehicle body as shown in FIG. 1 and FIG. 2. The fuel battery 4 is formed in a box-like shape, which is longer in the width direction of the vehicle. Under the fuel battery 4, a fan box 41 having a similar shape as the fuel battery

4 is attached to the pair of rear frames 24 being inclined downward toward the front side. In the fan box 41, the fan 3 is provided for introducing air to the fuel battery 4. An air outlet port 42 is formed behind the fan 3 in the fan box 41.

[0027] The small vehicle 13 is provided with the exhaust duct 10 for exhausting the air introduced by the fan 3 to cool down the fuel battery 4. The exhaust duct 10 is constituted of two-divided parts; i.e., a first exhaust duct 43 and a second exhaust duct 44. The first exhaust duct 43 is connected to the rear side of the fan box 41 for guiding the air after cooling the fuel battery 4. The second exhaust duct 44 is connected to the rear side of the first exhaust duct 43 avoiding the pair of rear frames 24. The second exhaust duct 44 exhausts the air from the first exhaust duct 43 to the outside.

[0028] The first exhaust duct 43 has a box-like first body 45 extending in the width direction of the vehicle. The first body 45 is formed with a first inlet port 46 in the front side thereof being connected to the air outlet port 42 of the fan box 41. The first body 45 is formed with a first central outlet port 47 in a central rear thereof as viewed in the longitudinal direction. The first body 45 is formed with a first side outlet port 48 at both sides respectively, in a slightly lower portion in a rear area as viewed in the longitudinal direction.

[0029] The second exhaust duct 44 has a second body 49 having a box-like shape extending in the width direction of the vehicle, and each of the both sides thereof is curved forward. The second body 49 is formed with a second central inlet port 50 in a central area thereof, as viewed in the longitudinal direction, connected to the first central outlet port 47 of the first exhaust duct 43. The second body 49 is formed with a second side inlet port 51 in a front lower portion at both sides respectively, as viewed in the longitudinal direction thereof. The second side inlet port connects to the first side outlet port 48 of the first exhaust duct 43.

[0030] As shown in FIG. 3, in the second exhaust duct 44, the second central inlet port 50 is connected to the first central outlet port 47; and the second side inlet ports 51 connect to the first side outlet ports 48 of the first exhaust duct 43 respectively, being interposed by a seal 52.

[0031] In the small vehicle 13 mounted with the fuel battery 4 as described above, the exhaust duct 10 is divided into two parts: i.e., the first exhaust duct 43 and the second exhaust duct 44. Therefore, even when the frame has a complicated structure, the two-divided parts can easily connect to each other and avoid the pair of rear frames 24. A maximum space is ensured for the duct path under limitations due to the vehicle structure.

[0032] That is, as described above, the exhaust duct 10 is divided into the first exhaust duct 43 and the second exhaust duct 44. The first exhaust duct 43 is integrated with the fuel battery 4 and the fan box 41 as a module and assembled with the vehicle body first. After that, the second exhaust duct 44 is inserted into the first exhaust

duct 43 from the rear side thereof. In order to avoid the pair of rear frames 24 as shown in FIG. 2, the exhaust duct 10 is arranged so that the first central outlet port 47 and two first side outlet ports 48 of the first exhaust duct 43 and the second central inlet port 50 and two second side inlet ports 51 of the second exhaust duct 44 are prepared separately and connected to each other afterward. Thus, the exhaust duct 10 is easily assembled with the vehicle body and a large space is ensured for the duct path.

[0033] Also, in the small vehicle 13 mounted with the fuel battery 4, a large space is ensured for the exhaust duct 10. Therefore, the exhaust duct 10 achieves a smaller pressure loss and thus a smaller airflow resistance. As a result, a fan 3 with a smaller output capacity may be employed; and accordingly, the fan 3 consumes less electric power. Thus, the fuel battery system 1 achieves higher system efficiency.

[0034] Further, in the small vehicle 13 mounted with the fuel battery 4, the first exhaust duct 43 and the second exhaust duct 44 are connected to each other with interposition of the seal 52. Therefore, air tightness in the connected portion is ensured to prevent air leakage therefrom, and thus the air after cooling the fuel battery 4 is prevented from being fed back into the vehicle body.

[0035] Referring to FIG. 3 and FIG. 4, the first exhaust duct 43 is formed with a first side drain port 53 at both sides, respectively, as viewed in the longitudinal direction of the first body 45, in the lowermost portion thereof. Each of the first side drain ports 53 is provided for discharging water collected in the first body 45. The first exhaust duct 43 is provided with the hydrogen purge pipe 11 being opened thereto in the vicinity of the first inlet port 46 connected to the air outlet port 42 of the fan 3 as shown in FIG. 3. The hydrogen purge pipe 11 is provided to discharge the hydrogen purged from the fuel battery 4. The hydrogen purged from the hydrogen purge pipe 11 is carried into the first exhaust duct 43 by the air flowing into the first inlet port 46 through the air outlet port 42.

[0036] With this arrangement, in the small vehicle 13 mounted with the fuel battery 4, the hydrogen purged from the fuel battery system 1 is diffused swiftly by the airflow within the exhaust duct 10. Thus, the purged hydrogen is exhausted out, along with the air, from the rear side of the vehicle. Accordingly, the purged hydrogen is prevented from being fed back into the inside of the vehicle by external wind.

[0037] In the second exhaust duct 44, the rear side of the second body 49 is bifurcated into a second upper bifurcation 54 and a second lower bifurcation 55 as shown in FIG. 3 and FIG. 4. The second upper bifurcation 54 guides the air flowing into the first exhaust duct 43 upward in a central area as viewed in the width direction of the vehicle. The second lower bifurcation 55 guides the air downward to expand toward both sides thereof as viewed in the width direction of the vehicle. The second upper bifurcation 54 is formed with a second upper outlet port 56 opened to the rear side thereof in a central area

as viewed in the width direction of the vehicle. The second lower bifurcation 55 is formed with a second lower outlet port 57, which expands to both sides of the upper outlet port as viewed in the width direction of the vehicle, and opens to the rear side of the vehicle. The second exhaust duct 44 is formed so that the second upper bifurcation 54 is inclined upward toward the rear side with respect to a horizontal line "H" in FIG. 3.

[0038] The second exhaust duct 44 is bifurcated into the second upper bifurcation 54 and the second lower bifurcation 55 to exhaust the air after cooling the fuel battery 4. By bifurcating the second exhaust duct 44 into the upper and lower two parts that avoid the rear combination lamp 34, a larger area is ensured for the duct path. The second upper outlet port 56 of the second upper bifurcation 54, which is the highest portion in the exhaust duct 10, is open. With this arrangement, even when the hydrogen remains within the exhaust duct 10 and when the fuel battery 4 and the fan 3 stop operating, the hydrogen can swiftly go out of the vehicle due to the buoyancy of the hydrogen itself, the specific gravity of which is less than that of air, without depending on the airflow.

[0039] In the small vehicle 13 mounted with the fuel battery 4, the second exhaust duct 44 is bifurcated into the upper and lower two parts and is opened to the rear side of the vehicle as described above. A large exhaust port is ensured while avoiding the rear combination lamp 34 constituting the rear part of the vehicle. Accordingly, the pressure loss of the air is reduced.

[0040] Further, in the small vehicle 13 mounted with the fuel battery 4, the second upper bifurcation 54, which is the highest portion within the exhaust duct 10, is open at the second upper outlet port 56. Even when the hydrogen remains mixed with the air within the exhaust duct 10 after the fan 3 stops operating, the hydrogen, the specific gravity of which is less than that of the air, goes upward due to the buoyancy thereof and rises upward. Thus, the hydrogen is prevented from remaining within the exhaust duct 10.

[0041] Furthermore, in the small vehicle 13 mounted with the fuel battery 4, the second upper bifurcation 54 is inclined upward toward the rear side. Therefore, even after the fan 3 stops operating, hydrogen, the specific gravity of which is less than that of air, is prevented from remaining within the exhaust duct 10.

[0042] The second exhaust duct 44 is formed so that the second upper bifurcation 54 is inclined upward toward the rear side of the vehicle as shown in FIG. 3 and FIG. 4. The second exhaust duct 44 is provided with a water reservoir 58 formed at the bottom of the second lower bifurcation 55 as viewed in the width direction of the vehicle. Further, a second water drain port 59 is provided for draining water received in the water reservoir 58 at the side that comes to the lower side when the vehicle is stayed or balanced on the side stand 29. In this embodiment, the drain port 59 is located at the left side that comes to the lower side when the vehicle is balanced on the side stand 29.

[0043] The water reservoir 58 of the second exhaust duct 44 receives water drops from condensation of vapor generated due to a reaction in the fuel battery 4 and rain water or the like entering from the outside. The water received by the water reservoir 58 is discharged to the outside through the second water drain port 59. The second water drain port 59 is provided at the left side of the water reservoir 58. When the small vehicle 1 is balanced on the side stand 29 located at the left side, the vehicle body is inclined leftward. With this, the received water is naturally drained from the left side. Different from the first exhaust duct 43, in the case where it is difficult to ensure a satisfactory water reservoir, by providing the first side drain port 53 at both right and left sides respectively, the water can be swiftly drained.

[0044] As described above, in the small vehicle 13 mounted with the fuel battery 4, the fuel battery 4 generates vapor due to the reaction therein and the vapor is condensed into water. Additionally, water enters into the second exhaust duct 44 from the outside. Such water is received by the water reservoir 58 and discharged outside of the vehicle through the second water drain port 59. Thus, water is prevented from being fed back into the fuel battery 4. When the vehicle is stayed or parked at an incline, the water is drained swiftly through the second water drain port 59 formed at a lower side while the vehicle is stayed or balanced on the side stand 29. In the small vehicle 13 mounted with the fuel battery 4, since the water is not trapped within the vehicle, the weight thereof is reduced.

[0045] In the second exhaust duct 44, the second upper bifurcation 54 and the second lower bifurcation 55 are formed so as to fit with and about the shape of the rear combination lamp 34 and the rear fender 35 as shown in FIG. 1.

[0046] With this arrangement, in the second exhaust duct 44, the second upper bifurcation 54 and the second lower bifurcation 55 are formed so as to fit with the rear combination lamp 34 and the rear fender 35 at a joint portion 60 therebetween and are sealed to each other. As a result, the size and weight of the second exhaust duct 44 is reduced, resulting in a cost saving. Further, in the second exhaust duct 44, inversely proportional to the reduction of weight and thickness of the duct, the opening area of the exhaust port is increased. Since the airflow path is not limited by the thickness and outer wall, a larger space is ensured for the duct path.

[0047] The rear fender 35 is formed in a shape that fits with the shape of the second lower outlet port 57 of the second lower bifurcation 55 while avoiding the number plate illumination lamp 37 as shown in FIG. 5.

[0048] As described above, in the small vehicle 13 mounted with the fuel battery 4, the shape of the rear fender 35 is formed so as to fit with the shape of the opening of the second lower outlet port 57 to ensure or provide the opening marked with slash lines in FIG. 5. Therefore, a large opening is ensured for the second lower outlet port 57 without changing the installation position

of the number plate 36 and the number plate illumination lamp 37. As a result, airflow resistance is reduced without affecting the function of the number plate illumination lamp 37.

[0049] The invention ensures a maximum space for the exhaust duct path under the limitations due to the structure of the small vehicle mounted with a fuel battery. The pressure loss and airflow resistance in the exhaust duct are reduced resulting in less electric power consumption by the fan to save electric power. The present invention is also applicable to electric bicycles driven by an air-cooled secondary battery with a cooling duct for providing electric power to a motor thereon.

Claims

1. A vehicle mounted with a fuel battery for generating electric power supplied to a motor for driving a drive wheel, the fuel battery being mounted on a frame acting as a vehicle body of the vehicle, comprising:

- a fan box (41) having a fan for introducing air into the fuel battery (4); and
- an exhaust duct (10) for exhausting the air introduced by the fan after cooling the fuel battery, wherein the exhaust duct is divided into two parts, comprising a first exhaust duct (43) connected to a rear side of the fan box (41), for introducing air after cooling the fuel battery and a second exhaust duct (44) connected to the rear side of the first exhaust duct (43) that avoids the frame, for exhausting air flowing therein from the first exhaust duct out of the vehicle body from the rear side thereof,

wherein the second exhaust duct (44) is bifurcated into two parts; a second upper bifurcation (54) for guiding air flowing therein from the first exhaust duct in a central area thereof as viewed in the width direction of the vehicle and a second lower bifurcation (55) expanding in both sides thereof for guiding air downward as viewed in the width direction of the vehicle, the second upper bifurcation (54) being formed with a second upper outlet port opened to the rear side of the vehicle in a central area thereof as viewed in the width direction of the vehicle, and the second lower bifurcation (55) being formed with a second lower outlet port expanding to both sides thereof as viewed in the width direction of the vehicle and being opened to the rear side of the vehicle.

2. The vehicle mounted with a fuel battery according to claim 1, wherein the first exhaust duct (43) is formed with a first inlet port (46) connected to an air outlet port (42) of the fan box (41), and the first inlet port (46) is provided with a hydrogen purge pipe (11) opened in the vicinity thereof for dis-

charging hydrogen purged from the fuel battery.

3. The vehicle mounted with a fuel battery according to claim 1 or 2, wherein the first exhaust duct (43) is connected to the second exhaust duct (44) with interposition of a seal therebetween.
4. The vehicle mounted with a fuel battery according to one of claims 1 to 3, wherein the second exhaust duct (44) is formed so that the second upper bifurcation is inclined upward toward the rear side thereof.
5. The vehicle mounted with a fuel battery according to one of claims 1 to claim 4, wherein the second exhaust duct (44) is provided with a water reservoir (58) at the bottom of the second lower bifurcation, and a second water drain port for draining water received in the water reservoir (58) at the side which moves to a lower position when the vehicle is inclined on a side stand.
6. The vehicle mounted with a fuel battery according to one of claims 1 to 5, wherein, in the second exhaust duct (44), the second upper bifurcation and the second lower bifurcation are formed so as to fit with the shape of a rear combination lamp and a rear fender.
7. The vehicle mounted with a fuel battery according to claim 6, wherein the rear fender is formed so as to fit with the shape of the second lower outlet port of the second lower bifurcation for avoiding a number plate illumination lamp.

Patentansprüche

1. Fahrzeug mit einer Brennstoffbatterie zum Erzeugen von elektrischem Strom, der einem Motor zugeführt wird, um ein Antriebsrad anzutreiben, wobei die Brennstoffbatterie an einem Rahmen befestigt ist, der als Fahrzeugaufbau des Fahrzeugs dient, aufweisend:

- einen Gebläsekasten (41) mit einem Gebläse zum Einspeisen von Luft in die Brennstoffbatterie (4); und
- einen Abgaskanal (10) zum Entlassen der Luft, die durch das Gebläse nach dem Kühlen der Brennstoffbatterie eingespeist wird, wobei der Abgaskanal in zwei Teile unterteilt ist, die einen ersten Abgaskanal (43), der mit einer Rückseite des Gebläsekastens (41) verbunden ist, um Luft nach dem Kühlen der Brennstoffbatterie einzuspeisen, und einen zweiten Abgaskanal (44) beinhalten, der mit der Rückseite des ersten Abgaskanals (43) verbunden ist, was den Rahmen

vermeidet, um Luft die von dem ersten Abgaskanal darin hinein strömt aus dem Fahrzeugaufbau heraus von seiner Rückseite zu entlassen,

wobei der zweite Abgaskanal (44) in zwei Teile verzweigt ist; eine zweite obere Verzweigung (54) zum Leiten von Luft, die von der Breitseite des Fahrzeugs her gesehen von dem ersten Abgaskanal in einem zentralen Bereich davon hinein strömt, und eine zweite untere Verzweigung (55), die sich in beiden Seiten davon erstreckt, um Luft, von der Breitseite des Fahrzeugs her gesehen, abwärts zu leiten, wobei die zweite obere Verzweigung (54) mit einer zweiten oberen Auslassöffnung ausgebildet ist, die zu der Rückseite des Fahrzeugs hin, von der Breitseite des Fahrzeugs her gesehen, in einem zentralen Bereich davon geöffnet ist, und wobei die zweite untere Verzweigung (55) mit einer zweiten unteren Auslassöffnung ausgebildet ist, die sich, von der Breitseite des Fahrzeugs her gesehen, zu beiden Seiten davon erstreckt und in Richtung der Rückseite des Fahrzeugs geöffnet ist.

2. Fahrzeug mit einer Brennstoffbatterie nach Anspruch 1, wobei der erste Abgaskanal (43) mit einem ersten Einlassanschlusskanal (46) ausgebildet ist, der mit einer Luftauslassöffnung (42) des Gebläsekastens (41) verbunden ist, und der erste Einlassanschlusskanal (46) mit einem Wasserstoffspülrohr (11) versehen ist, das in dessen Nähe geöffnet ist, um Wasserstoff, der aus der Brennstoffbatterie gespült wird, zu entlassen.
3. Fahrzeug mit einer Brennstoffbatterie nach Anspruch 1 oder 2, wobei der erste Abgaskanal (43) mit dem zweiten Abgaskanal (44) verbunden ist, wobei dazwischen eine Dichtung eingefügt ist.
4. Fahrzeug mit einer Brennstoffbatterie nach einem der Ansprüche 1 bis 3, wobei der zweite Abgaskanal (44) derart gestaltet ist, dass die zweite obere Verzweigung in Richtung ihrer Rückseite aufwärts geneigt ist.
5. Fahrzeug mit einer Brennstoffbatterie nach einem der Ansprüche 1 bis 4, wobei der zweite Abgaskanal (44) an dem unteren Ende der zweiten unteren Verzweigung mit einem Wasserbehälter (58) und mit einem zweiten Wasserabflusskanal zum Ablassen von Wasser versehen ist, das in dem Wasserbehälter (58) an der Seite aufgenommen wird, die sich in eine niedrigere Position bewegt, wenn das Fahrzeug auf einem Seitenständer geneigt wird.
6. Fahrzeug mit einer Brennstoffbatterie nach einem der Ansprüche 1 bis 5, wobei die zweite obere Verzweigung und die zweite untere Verzweigung in dem zweiten Abgaskanal (44) gebildet sind, so dass sie

mit der Gestalt einer hinteren Kombinationsbeleuchtung und einem hinteren Kotflügel zusammenpassen.

7. Fahrzeug mit einer Brennstoffbatterie nach Anspruch 6, wobei der hintere Kotflügel derart ausgebildet ist, dass er mit der Gestalt der zweiten unteren Auslassöffnung der zweiten unteren Verzweigung zusammenpasst, so dass auf eine Kennzeichenbeleuchtung verzichtet werden kann.

Revendications

1. Un véhicule sur lequel est montée une pile à combustible pour générer de la puissance électrique fournie à un moteur pour entraîner une roue d'entraînement, la pile à combustible étant montée sur un châssis faisant office de caisse du véhicule, comprenant :

- une boîte de ventilateur (41) comportant un ventilateur pour introduire de l'air dans la pile à combustible (4); et

- un conduit d'évacuation (10) pour évacuer l'air introduit par le ventilateur après refroidissement de la pile à combustible, le conduit d'évacuation étant divisé en deux parties, comprenant un premier conduit d'évacuation (43) relié à un côté arrière de la boîte de ventilateur (41), pour introduire de l'air après refroidissement de la pile à combustible et un deuxième conduit d'évacuation (44) relié au côté arrière du premier conduit d'évacuation (43) qui évite le châssis, pour évacuer l'air s'introduisant dans celui-ci à partir du premier conduit d'évacuation hors du véhicule à partir d'une extrémité arrière de celui-ci,

dans lequel le deuxième conduit d'évacuation (44) est bifurqué en deux parties; une deuxième bifurcation supérieure (54) pour guider l'air s'introduisant dans celui-ci à partir du premier conduit d'évacuation dans une zone centrale de celui-ci vu dans le sens de la largeur du véhicule et une deuxième bifurcation inférieure (55) s'élargissant au niveau de ses deux côtés pour guider l'air vers le bas tel que vu dans le sens de la largeur du véhicule, la deuxième bifurcation supérieure (54) étant formée avec un deuxième orifice de sortie supérieur ouvert vers le côté arrière du véhicule dans une zone centrale de celui-ci, vu dans le sens de la largeur du véhicule, et la deuxième bifurcation inférieure (55) étant formée avec un deuxième orifice de sortie inférieur s'élargissant au niveau de ses deux côtés vu dans le sens de la largeur du véhicule et étant ouvert vers le côté arrière du véhicule.

2. Véhicule sur lequel est montée une pile à combus-

tible selon la revendication 1, dans lequel le premier conduit d'évacuation (43) est formé avec un premier orifice d'entrée (46) relié à un orifice de sortie d'air (42) de la boîte de ventilateur (41), et le premier orifice d'entrée (46) est pourvu d'un tuyau de purge d'hydrogène (11) ouvert à proximité de celui-ci pour évacuer l'hydrogène purgé de la pile à combustible.

3. Véhicule sur lequel est montée une pile à combustible selon la revendication 1 ou 2, dans lequel le premier conduit d'évacuation (43) est relié au deuxième conduit d'évacuation (44) avec interposition d'un joint d'étanchéité entre les deux. 5
10
4. Véhicule sur lequel est montée une pile à combustible selon l'une des revendications 1 à 3, dans lequel le deuxième conduit d'évacuation (44) est formé de sorte que la deuxième bifurcation supérieure est inclinée vers le haut en direction de son côté arrière. 15
20
5. Véhicule sur lequel est montée une pile à combustible selon l'une quelconque des revendications 1 à 4, dans lequel le deuxième conduit d'évacuation (44) est muni d'un réservoir d'eau (58) au niveau du fond de la deuxième bifurcation inférieure, et un deuxième orifice d'évacuation d'eau pour vidanger de l'eau reçue dans le réservoir d'eau (58) sur le côté qui se déplace vers une position inférieure lorsque le véhicule est incliné sur un support latéral. 25
30
6. Véhicule sur lequel est montée une pile à combustible selon l'une des revendications 1 à 5, dans lequel, dans le deuxième conduit d'évacuation (44), la deuxième bifurcation supérieure et la deuxième bifurcation inférieure sont formées de manière à s'adapter à la forme des feux arrière et d'un pare-chocs arrière. 35
7. Véhicule sur lequel est montée une pile à combustible selon la revendication 6, dans lequel le pare-chocs arrière est formé de manière à s'adapter à la forme du deuxième orifice de sortie inférieur de la deuxième bifurcation inférieure pour éviter une lampe d'éclairage de la plaque d'immatriculation. 40
45

50

55

FIG.1

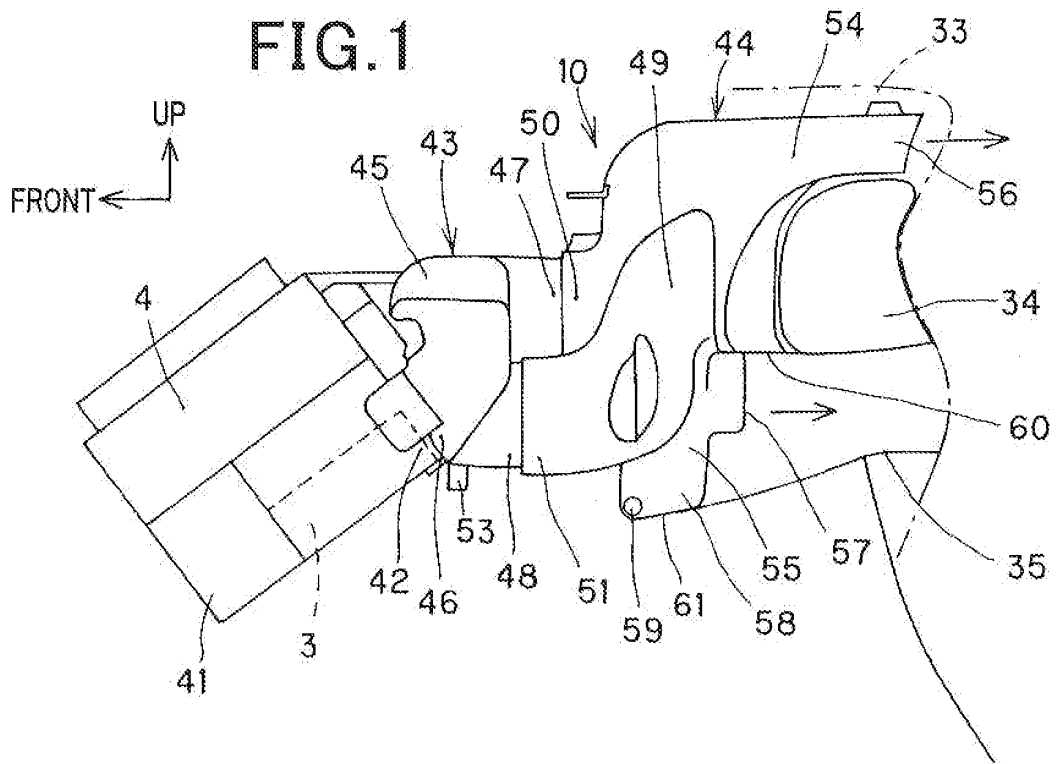


FIG.2

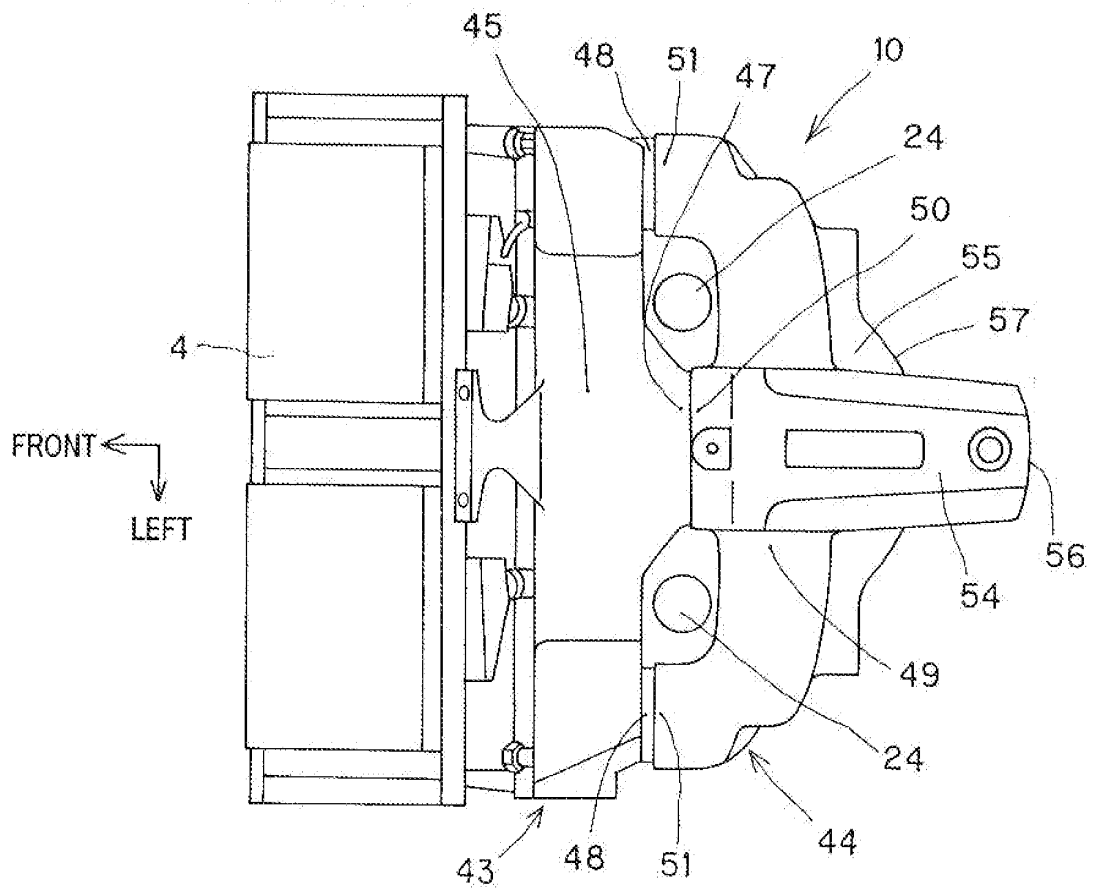


FIG. 3

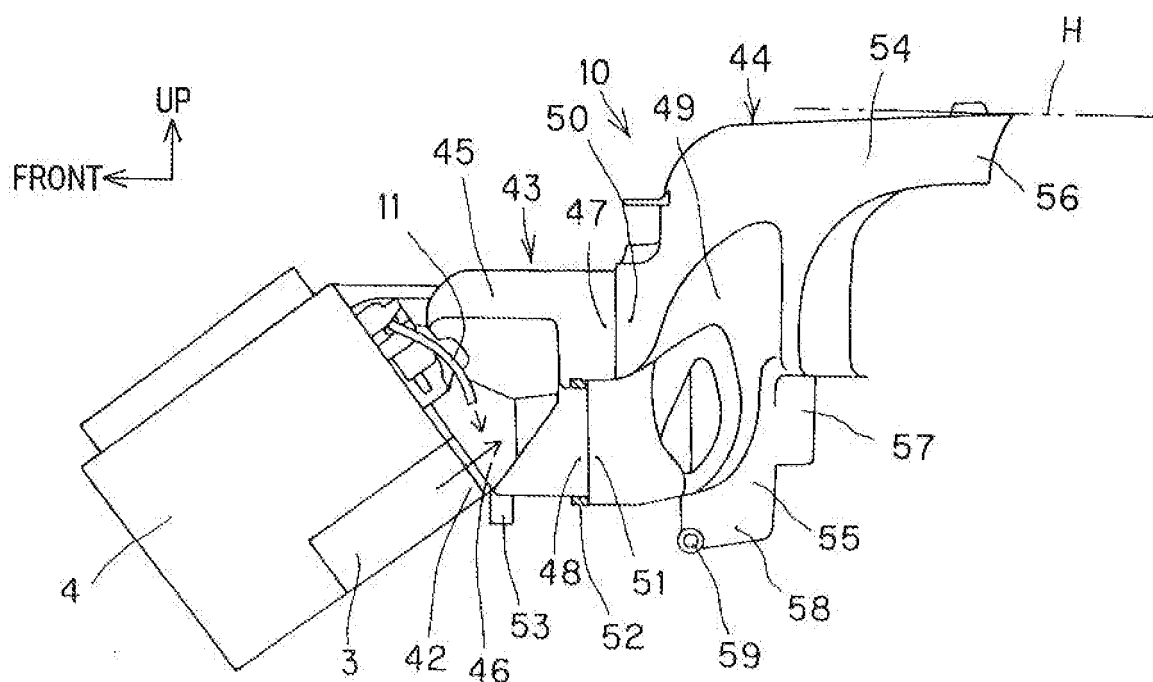


FIG. 4

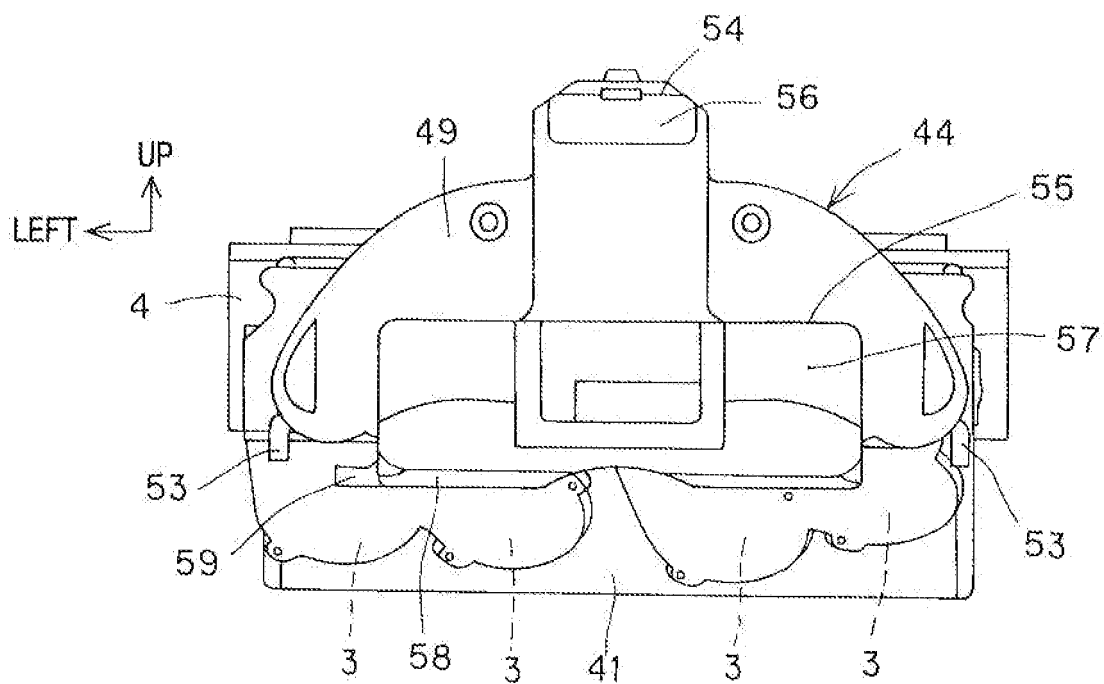


FIG. 5

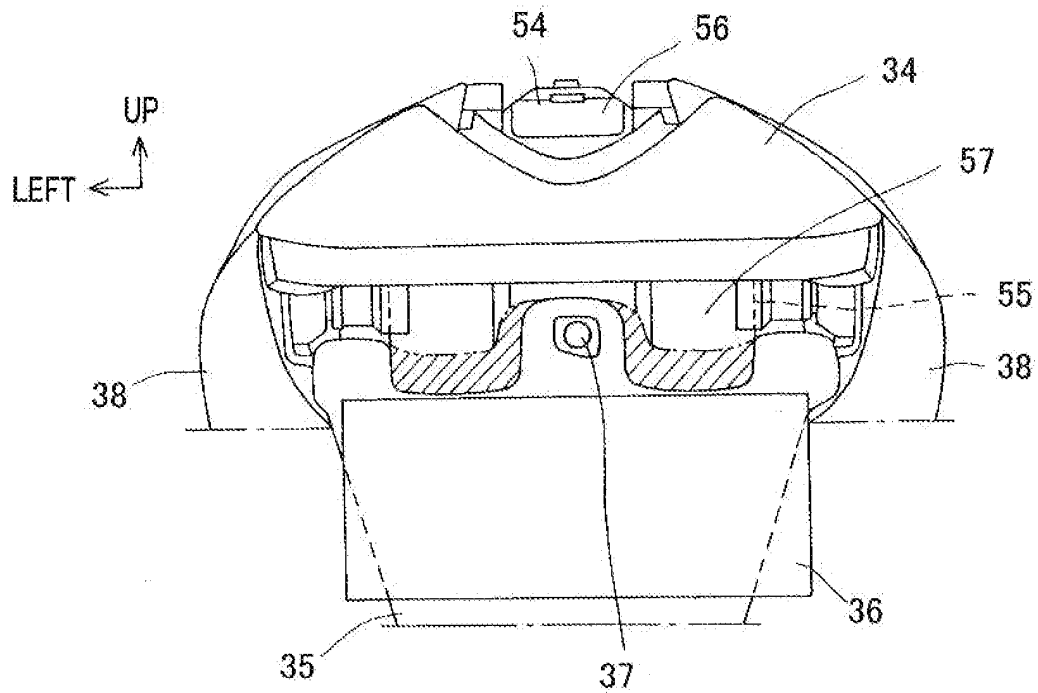


FIG. 6

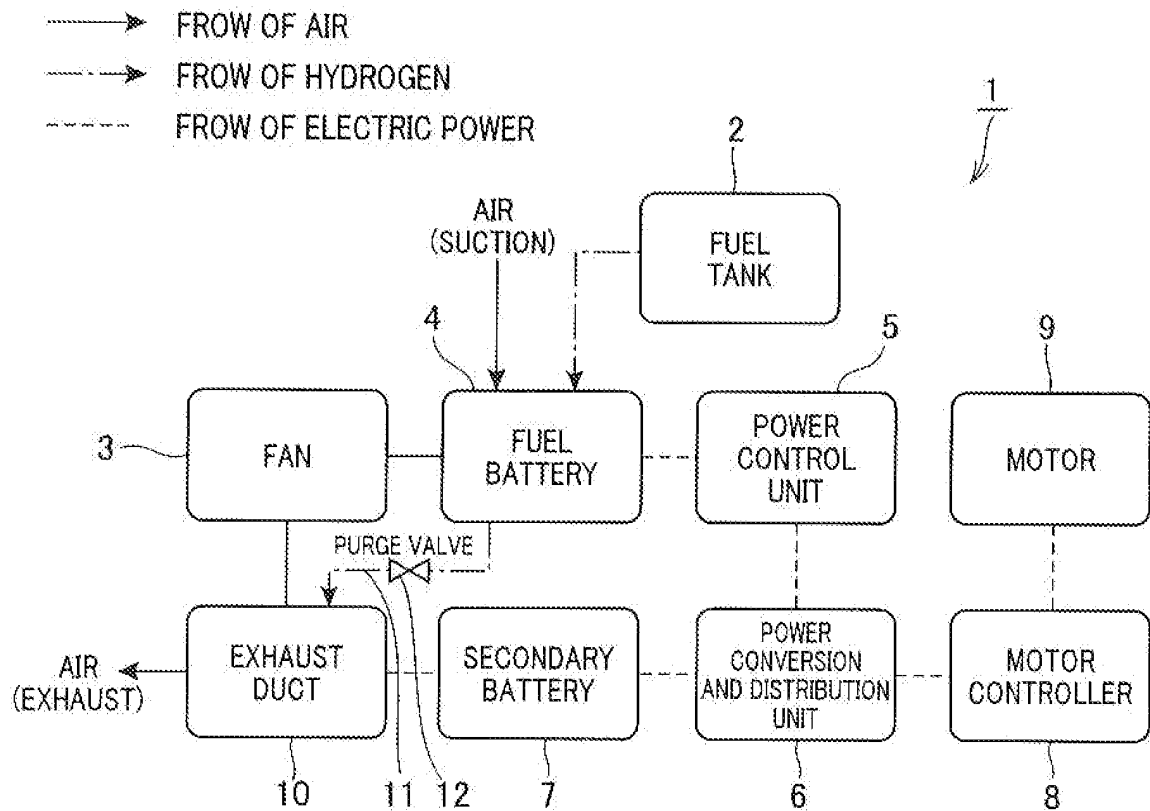
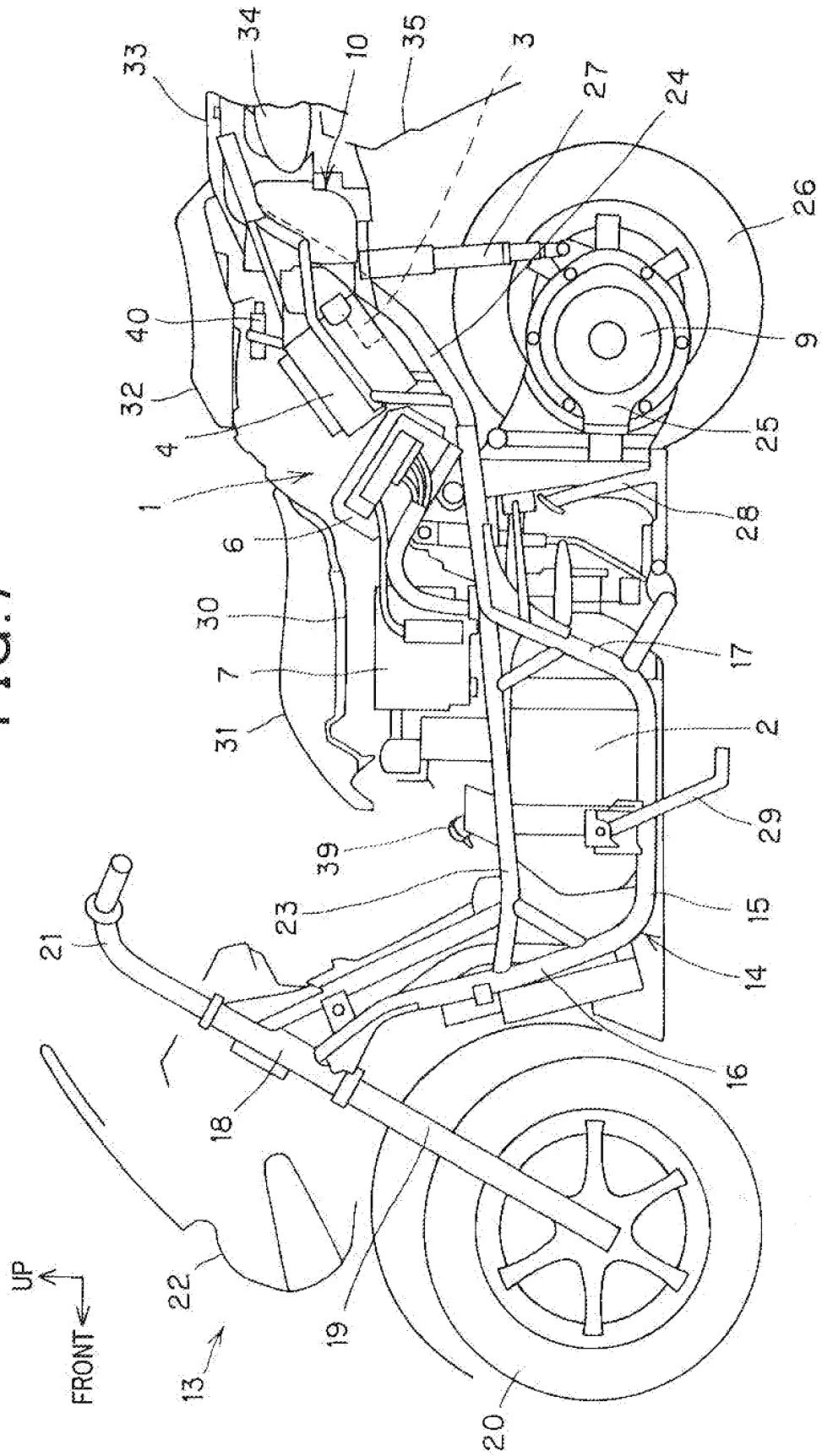


FIG. 7



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2008213742 A [0003]
- EP 1793446 A [0006]